

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

The second and third paragraphs of page 1 have been amended as follows:

Plastic resins are initially granular materials and are produced in pellets. These pellets are processed into finished or semi-finished products by molding, extrusion or other means in which the granular resin pellets are heated until the pellets melt and may then be molded or extruded into a desired shape. Typically granular resins melt at elevated temperatures, for example from 300-400°F, which is well above the boiling point of water.

Many granular resins have affinity for moisture. These hygroscopic resins absorb moisture and cannot be properly processed by molding or extrusion until dried. If processed before dry, the granular resin is dry, moisture in the resin being processed into plastic boils at or approaching the high plastic molding or extrusion process temperatures, leaving bubbles and perhaps other imperfections in the finished product. Hence, hygroscopic granular resins must be dried prior to molding or extrusion.

The third full paragraph of page 2 has been amended as follows:

In one of its aspects, this invention provides improvements in low pressure granular or powdery material drying of the type disclosed in U.S. patent 6,154,980 in which the dryer preferably includes a rotatable preferably vertical shaft, a plurality of preferably vertically-oriented, open-ended preferably cylindrical canisters which are preferably equiangularly positioned on a carousel which [rotatable] rotates about a vertical axis preferably defined by the shaft, where the canisters are movable serially and unitarily at least among material heating and vacuum drying positions.

The fifth paragraph of page 3 has been amended as follows:

The canister is further preferably adapted to effectuate material dispensing upon contact by a downwardly moving rod₁ of a top-mounted pneumatic piston-cylinder combination₁ moving an open centered valve member into position at the bottom of the canister for maximum flow downwardly therethrough. When open, the valve permits relatively unimpeded, free downward flow of material out of the canister.

The paragraph bridging pages 5 and 6 has been amended as follows:

In still another of its aspects this invention provides apparatus for drying granular or powdery material prior to molding or extrusion where the apparatus includes a first material processing chamber, a second material processing chamber, manifold means for furnishing material to be dried selectably to one of said first and second processing chambers preferably most recently having had dried material evacuated therefrom, means for heating material in a selected one of said first and second processing chambers into which material needing to be dried has been introduced, means for drawing vacuum over material in a selected one of said first and second processing chambers preferably having had said material most recently heated and means for withdrawing material from said chamber preferably having most recently dried material therein.

The first full paragraph on page 7 has been amended as follows:

In yet another of its aspects this invention provides a method for supply of dried granular resin material for processing from a supply of material which is [excessive] excessively moist where the method includes heating a portion of the moist material to a temperature at which moisture evaporates at a preselected level of vacuum, drawing at least the preselected level of vacuum over a second portion of the material which has been heated to a temperature for time sufficient to cause the moisture to evaporate therefrom and result in the second portion of material reaching a preselected dryness while periodically introducing hot air into the second portion of material under the preselected vacuum to purge moist air from around such material, and supplying to granular material processing equipment for molding or extrusion a third portion of the material which has been dried to the preselected dryness by moisture evaporation in the preselected level of vacuum after having been heated.

Paragraph 2 on page 7 has been amended as follows:

Figure 1 is an isometric view of a low pressure vacuum dryer apparatus in accordance with the preferred embodiment of the invention

Paragraph 3 on page 9 has been amended as follows:

Figure 14 is a [section] sectioned elevation of a material supply and fill hopper optionally provided for use with the dryer in accordance with the invention.--

The first full paragraph on page 10 has been amended as follows:

Dryer 10 includes a frame, designated generally 22, on and within which vertical shaft 24 is rotatably mounted for rotation relative to frame 22. Cylindrical canisters 12, riding on a carousel 21 rotating unitarily with vertical shaft 24, preferably move serially among a heating position designated generally 100, a vacuum drying position designated generally 102 and a material inventory

position designated generally 104 as indicated in Figure 12. Canisters 12 move when and as required among [heat] heating position 100, vacuum drying position 102 and inventory position 104. The three canisters 12 start and stop together as required due to movement of carousel 21; they do not move continuously in a merry-go-round fashion among positions 100, 102 and 104. Arrow [R] B in Figure 12 indicates the direction of rotation of carousel 21 and shaft 24.

The paragraph bridging pages 11 and 12 has been amended as follows:

A preferably horizontal suspension plate 166 is part of frame 22 and preferably extends laterally across an upper portion of dryer 10, below upper horizontal members 162. Suspension plate 166 is illustrated in Figures 2, 3 and 4 and serves as mounting structure for various components. A canister top sealing piston-cylinder combination designated generally 44, serving to seal the top of a canister 12 at vacuum drying position 102, is preferably mounted on horizontally extending suspension plate 166 as illustrated in Figure 3. Preferably there is no corresponding upper piston-cylinder combination or equivalent structure at [heat] heating position 100; the upper end of a cylindrical canister 12 at [heat] heating position 100 preferably remains slightly open with space between the upper extremity of canister 12 and a plate-like structure 150 which is associated with and fixedly connected to horizontally extending suspension plate 166, as illustrated in Figure 4.

The first full paragraph on page 13 has been amended as follows:

Pin-like extension 26 is secured at a portion thereof, remote from the position of securement to triangular plate 28, to vertical shaft 24. As a result, upon actuation of one of piston-cylinder combinations 34, 36, 38 with retraction of the associated piston-shaft resulting, such as illustrated for piston-cylinder combination 34 in Figure 11, vertical shaft 24 rotates one hundred twenty degrees (120°) upon actuation of a given piston-cylinder combination. In Figure 11, once piston-cylinder combination 36 is actuated to withdraw the piston rod portion of that piston-cylinder combination into the cylinder, this results in counterclockwise rotation of shaft 24 through an angle of one hundred twenty degrees (120°) thereby moving canisters 12 in an indexing fashion to the next successive one of [heat] heating and [fill] filling position 100, vacuum drying position 102 and inventory position 104.

The third full paragraph on page 16 has been amended as follows:

There is further illustrated in Figure 1 a triangular template 134 which is manually moveable and which fits over a manual switch serving as an interlock for the pneumatic feed piston-cylinder combinations 170 and 198. Triangular template 134, when moved by an operator, throws a manual switch disabling the pneumatic circuitry for piston-cylinder combinations 170 and 198 thereby enabling an operator to manually remove a canister 12 from material inventory

position 104. Reverse manual movement of template 134 by an operator (or the action of closing door 13 if the operator forgets to move template 134 back to the operating position) moves template 134 back into position whereby template 134 throws a switch serving to reactuate the pneumatic drive circuit for piston-cylinder combinations 170 and 198.

The first full paragraph on page 17 has been amended as follows:

The curved cylindrical wall of discharge valve cylinder 406 fits closely within a central aperture 405 of plate 404 illustrated in Figures 7 and 13. Perforate downwardly opening funnel 94 fits at its narrow end against plate 404 just outside the periphery of central aperture 405. Hence, granular material within canister 12 is vertically supported by perforate downwardly opening funnel 94 and cannot escape therefrom through the central opening since such central opening 405 is occupied by the axially displaceable discharge valve cylinder 406.

The second paragraph on page 19 has been amended as follows:

As shown in Figure 4, mounted on the lower side of suspension plate 166 and positioned to fit closely but slightly spaced from and around the outer periphery of the canister top is a preferably [circulate] circular plate structure 150. An annular lip portion 152 of plate structure 150 fits closely to but is slightly spaced from the circular periphery of a canister 12 at fill and heating position 100. An aperture 154 leading to a conduit 157 is within plate structure 150 and facilitates communication between a material fill hopper 500 (see Figure 14) or equivalent structure, positioned on the top of dryer 10, and the interior of a canister 12 at fill and heating position 100

The paragraph bridging pages 20 and 21 has been amended as follows:

Referring to Figure 6, a discharge conduit 144 is connected tightly to an aperture in plate structure 150 for passage therethrough of heated air from canister 12 in heating position 100 after the heated air has passed through the moist granular or powdery plastic resin material within canister 12. Discharge conduit 144 preferably leads to a duplex pneumatic valve box 600 illustrated in Figures 15 and 16 and described in more detail below. Direction of air flow within discharge conduit 144 is indicated by arrows "a" in Figure 6.

The first full paragraph on page 22 has been amended as follows:

Referring to Figures 7 and 13, each preferably cylindrical canister 12 preferably includes a cylindrical shell designated generally 14. Each cylindrical shell 14 is preferably defined by a single wall tube designated 52 in the drawings. An insulative jacket 54, depicted in Figures 2, 3 and 4, preferably fits about the annular exterior of tube 52 and is equipped with a zipper 55 extending axially the length of jacket 54 when jacket 54 is in place about tube 52. Jacket 54 is

sufficiently resilient that when zipper 55 is closed, jacket 54 stretches slightly circumferentially about tube 52 with the resulting radially inwardly force on tube 52 exerted by jacket 54 retaining jacket 54 in position around the exterior of tube 52.

The first full paragraph on page 25 has been amended as follows:

Canister top and bottom vacuum sealing plates 40, 42 are preferably respectively connected to unnumbered piston rod extensions which are parts of canister top and bottom sealing piston-cylinder combinations 44, 46 respectively. Piston-cylinder combinations 44, 46 are preferably pneumatically actuated by the microprocessor and solenoid valves as described above. The cylinder portion of top piston-cylinder combination 44 is fixedly connected to suspension plate 166 while the cylinder portion of bottom piston-cylinder combination 46 is fixedly connected to a lower cross member 152 of frame 22, in a manner similar to that of the piston-cylinder combination which actuates movable lower plate 86 at heating and fill position 100, as illustrated in Figure 5.

The first full paragraph on page 26 has been amended as follows:

Referring to Figures 5 and 6, canister bottom sealing plate 42 at vacuum drying position 102 includes a purging hot air aperture 50 appearing in both Figures 5 and 6. Aperture 50 provides an outlet into a canister 12 located at the vacuum drying position for a purge line 62 leading from the hot air supply represented by conduit 158 illustrated in Figure 6. A purge valve 64 is provided within purge line 62 to open and close that line thereby to permit and block flow of hot air into a canister 12 at the vacuum drying position 102. Purge line 62 and purge valve 64 permit purging of moisture from granular resin material undergoing vacuum drying by periodically introducing hot dry air into that granular resin material and letting that hot dry air be drawn through the material by the vacuum being drawn out at the top of the canister. The effect of this is to give better efficiency, namely higher resulting dryness of the granular resin material when it finishes drying at the vacuum drying position 102. Purging typically lasts for thirty (30) seconds or one minute or even one minute and thirty seconds out of the total drying cycle time of twenty (20) minutes. Purging is desirably done at the end of the drying cycle and may also be done in the middle of the cycle as well.

The second, third and fourth full paragraphs on page 28 have been amended as follows:

The material [heat] heating and vacuum drying functions may each take approximately twenty minutes. Accordingly, in one hour, all three canisters 12 preferably cycle through material fill and heat position 100, vacuum drying position 102 and material inventory and dispense position 104. If each canister 12 is approximately 10 inches in diameter and 24 inches high, each canister 12

will hold about one cubic foot of granular resin material, which is about thirty-five pounds of granular resin material. With such configuration, dryer 10 provides about 100 pounds per hour of dried granular resin material for subsequent processing by plastic injection molding or extrusion equipment. The size may be scaled up or down, as desired.

Canisters 12 are preferably provided equally spaced around vertical shaft 24 with canisters 12 being [120°] 120 degrees apart.

Referring to Figures 2, 6, 8, 9 and 10, vacuum material takeoff box 182 is provided at the bottom of material inventory position 104 for removal and conveyance of [a] dried granular material from dryer 10 to a process machine such as a compression or injection molding press or an extruder. The vacuum material takeoff box is designated generally 182 in the drawings and has a material takeoff tube 184 rotatably resident therewithin.

The first and second full paragraphs of page 29 have been amended as follows:

Referring to Figures 8, 9 and 10, material takeoff box 182 includes manually rotatable material takeoff tube 184 and an air inlet 187 providing the inlet for a vacuum or suction based material delivery system via which granular material within material takeoff box 182 is carried by subatmospheric pressure air from the interior of rotatable material takeoff tube 184 outwardly, as indicated by arrow O in Figure 10. Air supplied to inlet 187 is denoted by arrow I in Figure 10. The rotatable characteristic of tube 184 allows adjustment of material flow rate therethrough by adjustment of the angular position of tube 184.

A material fill aperture 186 is present in rotatable material takeoff tube 184. Aperture 186 is preferably axially elongated and formed as a cutout in the wall of tube 184, with the cutout preferably being defined by two preferably substantially straight edges which are parallel with the axis of tube 184 and two preferably substantially parallel arcuate edges formed along lines of circumference of tube 184, as illustrated in Figure 10. Desirably, the two substantially parallel arcuate edges forming two of the boundaries of material fill aperture 186 subtend angles of less than [180°] 180 degrees.

The paragraph bridging pages 29 and 30 has been amended as follows:

Preferably forming a part of the same essentially planar surface of material takeoff box [10] 102 is a second pivoting lower front plate 192 which is preferably similarly formed of clear plastic or safety glass material in the same manner as first pivoting upper front plate 190, but which pivots about an edge parallel with the edge denoted A in Figures 8 and 10, with such edge being denoted B in Figures 8 and 10. An upper edge of lower front plate 192 preferably overlaps a lower edge of upper front plate 190 when the plates are in their essentially co-planar disposition, providing a closed front for takeoff box 182 as illustrated in Figure 8. The upper edge of lower front plate 192 is denoted 192U

in Figure 8. Pivoting action of plates 190, 192 to open the front of box 182 facilitates cleanout thereof.

The second full paragraph on page 30 has been amended as follows:

A collection of generally angularly disposed preferably at least partially planar baffles are preferably provided within material takeoff box 182; [where] the baffles are denoted generally 194, 194A, etc. Baffles 194 serve to deflect and diffuse the vector of incoming air at air inlet 187 thereby to render more efficient the vacuum pickup of pellets of granular resin material for conveyance thereof by the slightly subatmospheric pressure air drawn out of the interior of rotatable material takeoff tube 184. Motion of the diffuse air within material takeoff box 182 is generally denoted by arrows labeled "a" in Figure 10.

The paragraph bridging pages 30 and 31 has been amended as follows:

Referring to Figures 6, 15 and 16, a duplex pneumatic valve box is designated generally 600 and is used to control air flows in the dryer of the invention. Duplex pneumatic valve box 600 includes a pneumatic piston-cylinder combination 602 which moves a shaft 604 between the positions illustrated in Figures 15 and 16. Mounted on shaft 604 are first and second valve [member] members 606, 608, each of which preferably includes two valve disks resiliently coupled by a coil spring. The valve disks and coil spring are not numbered in Figures 15 and 16 to aid drawing clarity.

The first and second paragraphs of page 31 have been amended as follows:

Duplex pneumatic valve box 600 has a positive pressure portion and a negative pressure portion as indicated by the brackets in Figure 16. An inlet to the positive pressure portion is denoted [to] 2 in Figures 15 and 16 and is the position at which hot air is supplied to duplex pneumatic valve box 600 by blower 76 via conduit 156 as illustrated in Figure 6.

Duplex pneumatic valve box 600 has two outlets from the positive pressure portion. The outlet numbered 1 in Figures 15 and 16 connects to conduit 158, illustrated in Figure 6, which conveys hot air from the positive pressure portion of duplex pneumatic valve box 600 to a canister 12 located at material fill and heating position 100₁ as illustrated in Figure 6₁ when duplex pneumatic valve box is in the configuration illustrated in Figure 16.

The first full paragraph on page 32 has been amended as follows:

Aperture 5 in the negative pressure portion of the duplex pneumatic valve box 600 communicates with conduit 136 leading to air filter 82₁ which in turn is connected to inlet aperture 78 of blower 76.

The paragraph bridging pages 32 and 33 has been amended as follows:

Duplex pneumatic valve box 600 effectuates an important feature, namely the ability to provide hot conveying air as the means used to move the dried granular resin material, once that material has been dried, to the operating position, namely to fill cylinder 142 for molding or extrusion. This is advantageous over the use of ambient air from the room in which dryer 10 is located to move granular resin material from dryer 10 to where the material is needed. Valve box 600 allows hot air from blower 76 to be supplied to vacuum material takeoff box 182 to move granular resin material from vacuum material takeoff box 182 to fill cylinder 142. This use of hot air helps the granular resin material to stay warmer longer; it is desirable to process the granular resin material by molding or extrusion while the granular resin material is warm. If the granular resin material is allowed the opportunity to cool, the granular resin material picks up moisture which adversely affects performance of the granular resin material when molded or extruded. Use of hot air to convey the granular resin material after it has been dried[,] keeps the granular resin material warm longer, giving more lead time for molding or extrusion.

The first full paragraph on page 34 has been amended as follows:

When axially displaceable material supply valve cylinder 508 is in the upper position illustrated in solid lines in Figure 14, the open upper end of axially displaceable material supply valve cylinder 508 is covered by material supply valve umbrella 506 and the curved wall of cylinder 508 extends axially past the aperture in the bottom 518 of container 512. As a result, at this position[,] no granular material within supply hopper 500 can flow downwardly through the interior of axially displaceable material supply valve cylinder 508.

The third paragraph of page 35 has been amended as follows:

The dryer according to the invention reduces labor costs in that [clean out] clean-out time for hoppers for a color or material change is minimal. Typically, a dryer according to the invention should require less than 10 minutes of total time to clean whereas a conventional desiccant dryer can take up to one hour for cleaning.

The paragraph bridging pages 35 and 36 has been amended as follows:

Desiccant dryers typically require material feed hoppers to be at least half full for proper air flow. Hence if material usage is low for a particular molding operation, extended exposure to heat in a conventional desiccant dryer may degrade the plastic resin molding material. There is no such requirement for a full canister for the dryer in accordance with the invention to operate properly.

The first full paragraph on page 36 has been amended as follows:

Test data reveals that operating costs of the dryer according to the invention are less than one-half that of a desiccant dryer having the same capacity. In many cases operating cost is reduced by as much as 80% over that of a desiccant dryer having the same capacity. Additionally, [start up] start-up time using a dryer in accordance with the invention is under one hour whereas typical desiccant dryers require four hours or more for start-up [time].

The first full paragraph on page 37 has been deleted as follows:

[The dryer in accordance with the invention requires less floor space than a desiccant dryer having similar capacity.]

The paragraph bridging pages 37 and 38 has been amended as follows:

The microprocessor controller of the dryer preferably includes thumbwheel switches or functionally equivalent structure which are used to set temperature to which the resin or other granular material is to be heated prior to drying. Another thumbwheel switch or functionally equivalent structure is preferably used to set the minimum acceptable time as the time for a heating cycle and a drying cycle. Typically 20 minutes is the cycle time for acrylic, ABS and polycarbonate while 40 minutes is the cycle time for PET. A third thumbwheel switch or functionally equivalent structure is preferably used to set fill time, which controls the time for filling a canister at the fill and heat position. [The fill time controls the amount of material filled into the canister at the fill and heat position.]

The paragraph bridging pages 39 and 40 has been amended as follows:

The microprocessor [that] next turns on the venturi vacuum generator 48, or the vacuum pump if used in place of the venturi generator, and if adequate vacuum is not attained within 90 seconds, the microprocessor activates an alarm. Assuming the alarm was not actuated, the microprocessor actuates blower 76 and turns on heater 82 shortly thereafter. The microprocessor checks for increasing temperature and if a temperature increase in the air supplied by blower 76 to a canister 12 at material fill and heat position 100 is not detected within 60 seconds, the microprocessor turns off heater 82, stops operation of the dryer and sounds an alarm.

The first full paragraph on page 40 has been amended as follows:

When the microprocessor opens valve 108, the canister 12 located at fill and heat position 100 begins to fill with material to be dried. Hot air enters the bottom of canister 12 to heat the granular material as canister 12 fills with material. Typically the heating process continues for twenty (20) minutes, assuming this is the time that has been set by the operator and input to the microprocessor. Blower 76 and heater 82 are sized complementally to heat a

single canister 12 of material in twenty (20) minutes. Sometimes material near the top of canister 12 may not reach the full heating temperature in twenty (20) minutes but this may be acceptable as full heating may not generally be required for full drying. After twenty (20) minutes, the heating cycle ends, carousel locking arm 124 is retracted from a vertex position 173 of lockable cam 174 by actuating piston-cylinder combination 176 thereby freeing carousel 21 for rotary motion, and an appropriate one of first, second and third driving rotation piston-cylinder combinations 34, 36, 38 is actuated thereby to index canisters 12 carried by carousel 21 to the next position.

The third, fourth and fifth full paragraphs on page 41 have been amended as follows:

Figure [13] 20 schematically depicts a second embodiment of a vacuum dryer embodying aspects of the invention where the vacuum dryer is designated generally 200. A material supply container 202 or equivalent structure is provided as indicated schematically at the top of Figure [13] 20; material supply container 202 need not be a part of vacuum dryer 200.

A preferably tubular material feed line 224 or equivalent structure leads out of material supply 202, preferably downwardly, and connects to a material flow control valve or equivalent structure depicted schematically as 204 in Figure [13] 20.

Material flow control valve 204 provides material to either of two material feed lines 226, 226A or equivalent structure which lead to respective ones of first and second material processing chambers 210, 212 or equivalent structure, both of which are illustrated as vertically oriented cylindrical processing chambers in Figure [13] 20. Other geometric configurations and shapes may also be used.--

The paragraph bridging pages 41 and 42 has been amended as follows:

First and second material processing chambers 210, 212 are equipped with means for heating granular material, such as plastic resin, delivered thereinto via material feed lines 226, 226A. The heating means may be one or more electrical resistance heaters as illustrated schematically and [designed] designated 214, 216 in first and second material processing chambers 210, 212. Alternately and preferably hot air is blown through first and second material processing chambers 210, 212 to effectuate heating of material contained therewithin, in the same manner illustrated and disclosed above generally with respect to the preferred embodiment.

The paragraph bridging pages 43 and 44 has been amended as follows:

Once the evaporation operation has been completed with respect to the material in chamber 210 and the heating has been completed with respect to the

material in chamber 212 by virtue of that material having reached the required temperature for evaporation of moisture therefrom, the position of valve 206 may be switched so that vacuum pump 208 draws a vacuum within chamber 212 through conduits 228A and 230. During this time, dried material within chamber 210 may be evacuated via lines 232 and 234 by opening valve 218 so that material may flow downwardly into reservoir 222 and be stored therein until needed for processing by the process machine, to which that material may then be carried by line 236. Once first material processing chamber 210 is empty, chamber 210 may be refilled using material from supply 202 by appropriate positioning of valve 204, whereupon material may flow from supply 202 via conduits 224, 226 into chamber 210 and the process repeated.

The second and third full paragraphs on page 44 have been amended as follows:

Vacuum dryer 200 illustrated in Figure [13] 20 is depicted schematically. First and second material processing chambers 210, 212 are desirably equipped with heated air inlet and outlet hoses and with vacuum inlet and outlet hoses and vacuum sealing means of the type disclosed above with respect to the preferred embodiment of the invention.

Valve 204 functions as a manifold, preferably being connected to the first and second processing chambers 210, 212, and preferably selectably furnishes material to be dried to one of the two first and second processing chambers. Desirably, valve 204 acts as a manifold to furnish material to a selected one of first and second chambers 210, 212 most recently having dried material evacuated therefrom. Furthermore, it is desirable that first and second processing chambers 210, 212 have separate means for heating material in each of or [associates] associated with those two chambers.

The first two paragraphs on page 45 have been amended as follows:

The apparatus illustrated in Figure [13] 20 may be modified to utilize only a single material processing chamber, either 210 or 212. While this arrangement may be less expensive, it is also less efficient in that granular material to be dried cannot be effectively dried under vacuum until heating has been completed, as noted above.

A third embodiment of a vacuum dryer manifesting aspects of the invention is illustrated schematically in Figure [14] 21 with the vacuum dryer being designated generally 300 and including a material processing chamber designated generally 302.

The third full paragraph on page 46 has been amended as follows:

During operation of the embodiment of the dryer apparatus illustrated in Figure [14] 21, a first portion of granular or powdery material to be dried is preferably advanced from a supply in material supply container 304 preferably through material inlet conveying tube 328 into heating zone 312 of material processing chamber 302. Once within heating zone 312, that first portion of material is heated, preferably by forcing or drawing hot air through the material. Temperature of the material is preferably regulated substantially in the same manner as described above, namely by comparing temperature of the air going into the material and temperature of the air coming out of the material, and when those air temperatures are equal, the material is known to be substantially heated to the required temperature.

The paragraph bridging pages 46 and 47 has been amended as follows:

Once the first portion of heated material is known to be substantially at the required temperature, that first portion of material preferably is advanced from heating zone 312 preferably into vacuum drying zone 314, preferably by opening sealing trap door 318 or equivalent structure separating heating zone 312 from vacuum zone 314 and allowing the heated material to fall due to gravity from heating zone 312 into vacuum drying zone 314.

The third full paragraph on page 47 has been amended as follows:

Once drying of the first portion of material is substantially completed in vacuum drying zone 314, second sealing trap door 320 or equivalent structure preferably may be opened and the first portion of material, which is now dried to the required level, may preferably advance downwardly, preferably due to the force of gravity, through dried material discharge conduit 332 or equivalent structure, into reservoir 324 or equivalent structure in which the dried granular material is preferably stored until needed by the process machine.

The paragraph bridging pages 47 and 48 has been amended as follows:

Conventional industry practice is to dry, then blend and then process granular resin material using a desiccant dryer, then a gravimetric blender and then a molding machine. The dryer of the invention facilitates reversal of that process, namely permitting drying to be done after measuring and blending. This is advantageous because of problems associated with desiccant dryers, when used after the blending step, including separation of the blend resulting in a large quantity of resin material being already preblended that might not be usable in the event of such separation. This is the reason desiccant dryers are conventionally used prior to gravimetric blenders in the plastics molding industry. Since the invention facilitates drying of granular material after the measuring and blending of such material, the invention eliminates the risk involved in storing preblended material, namely separation of the blend which may render the material unusable.

The second full paragraph on page 48 has been amended as follows:

A dryer in accordance with the invention uniformly and consistently exhibits a six-fold reduction in drying time over that experienced using conventional desiccant dryers when drying granular plastic resin material prior to molding or extrusion. Such conventional desiccant dryers rely entirely on blowing warm air over the plastic material and having the warm dried air draw and absorb moisture out of the plastic material of interest.

The first full paragraph on page 49 has been amended as follows:

In a typical application where a molding machine may require 100 pounds per hour of processed, dried, ready to mold plastic resin, a dryer in accordance with the invention can supply the same using a 35 pound capacity canister since such canisters cycle in 20 minutes at each of the three positions. Accordingly, during each hour 105 pounds of material may be supplied from the dryer, ready to be processed by the molding machine.

The paragraph bridging pages 49 and 50 has been amended as follows:

A desiccant dryer process requiring 100 pounds throughput of material per hour requires a four hour lead time since such a desiccant dryer typically requires four hours to provide the first batch of material at acceptable dryness. In contrast, a dryer in accordance with the invention only needs 40 minutes to provide the first batch of material at acceptable dryness for startup of the molding operation. A further advantage [is] afforded by the dryer in the preferred embodiment of the invention results from the use of three separate canisters in the heating, vacuum drying and material inventory positions 100, 102 104. This means that a new color may be introduced into the drying procedure while the preceding color or final batch of plastic resin material with the preceding colors is being dried and delivered. Hence, there is no interruption in operation of the dryer in order to change colors of the granular resin material being dried. In contrast, a conventional desiccant dryer would require four hours of down time in order to change the color of the granular plastic resin being dried.